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TWO CASES OF SARCOMATOSIS WITH
PURPURA HÆMORRHAGICA

BY

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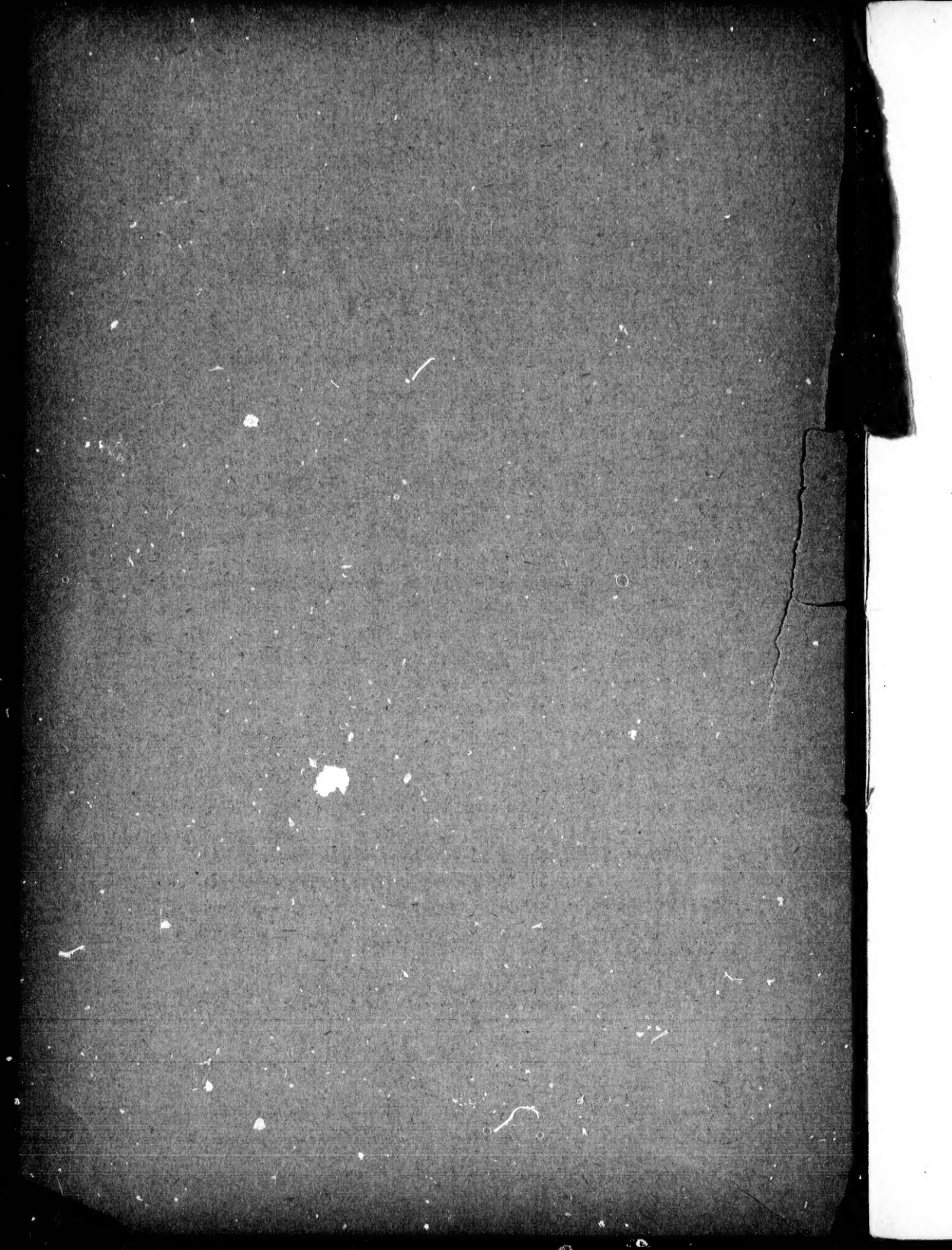
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TWO CASES OF SARCOMATOSIS WITH PURPURA HÆMORRHAGICA

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PLATES XXI, XXII, AND XXIII.

CASES of sarcoma in which purpura hæmorrhagica has been present as a concurrent condition are comparatively rare. The volumes at our disposal contain references on the subject only by Hilton Fagge* and Railton.† According to the latter author, the subject has also been studied by Kingsford and Anderson, though we could obtain no evidence of their work in the literature.

Fagge, in an interesting article published more than fifteen years ago, gives six records taken from the *Guy's Hospital Reports*. In these cases purpura and sarcomatous tumours were coincident, so far as macroscopic appearances and clinical observations could verify the conditions. In four of the cases, however, no microscopic examination was made, while in the two remaining instances the pathological reports and microscopic examinations are, to say the least, unsatisfactory.

The most interesting of all these is perhaps Case I, in which the purpura was present about the chest and abdomen, the hæmorrhagic infiltration appearing in the form of narrow rings surrounding round, elevated, hard nodules, the conditions being evidently identical with those found in our second case. There were also the same tendency of the cells to infiltrate the adipose tissue and the same visceral hæmorrhages. The main growth, which began in the ileum, was made up of small round cells.

* Hilton Fagge, *Guy's Hospital Reports*, vol. xxv.

† Railton, *British Medical Journal*, May 18, 1895.

In three of the other cases there were no nodules in the skin.

In one instance in which no autopsy was obtained the multiple growths in the skin and glands appeared as flattened thickenings in the brownish-stained skin. The purpura seems to have formed chiefly around the hair follicles. In the last case of all, where no microscopic examination was made, the skin presented many swellings, which on section seemed to contain merely fibrin and blood.

Out of all six cases, then, a microscopic examination of the skin was made in but one instance, and even in this no report of the condition of the vessels is recorded. In his concluding remarks the author suggests the possibility that the prevalence of purpura having been first noted in these cases, the hospital records of instances of so-called Werlhofs's disease may in reality refer to conditions of sarcomatous origin, the primary growth, perhaps, remaining obscured in the medulla of the bones or elsewhere. From the fact, however, that in three of his cases the onset was ushered in with a chill, and that there had been a previous exposure to wet, Fagge regards this factor as a possible direct cause of sarcoma, in which case the multiple tumours would have to be considered not as metastases, but rather as a uniform development of numerous growths, each in itself primary.

Fagge advances several possible explanations of the relationship between sarcoma and purpura. The first, as has been already indicated, supposes that a minute development of sarcomatous tissue, with vessels made up of embryonic cells, takes place at each effused spot, apart from any infection or appearance of metastases, and that the conditions are somewhat analogous to those which occur in molluscum fibrosum. The second explanation is based upon the embolic theory, the sarcoma cells reaching the capillary vessels. Thirdly, Fagge deems it not impossible that the condition of cachexia, with its altered blood state, which is of frequent occurrence in sarcoma, might of itself suffice to produce the purpuric condition, the sequence of events being analogous to that which characterizes the grave anæmias.

In the case recorded by Railton the skin of the head was mainly

affected, large sarcomatous nodules existing in this region, with hæmorrhages in their immediate vicinity. There were elsewhere no cutaneous effusions. The liver and retroperitoneal glands were the only organs showing sarcomatous infiltration.

The cases which have come under our notice are as follows:

CASE I.—Janet H., aged thirty-five years, was admitted to Prof. James Stewart's wards in the Royal Victoria Hospital on May 6, 1895, complaining of anorexia, great thirst, which had existed for one week previously, with pain in the epigastrium, increased by pressure. For the past two months she had been losing flesh. Two days prior to admission she observed a discoloured patch on the right forearm about the size of a twenty-five-cent piece, and had also some bleeding from the gums. On the following day she vomited a cupful of dark-coloured bloody fluid; the bleeding from the gums continued, and further areas of subcutaneous hæmorrhage appeared; these rapidly increased in size and number up to the day of admission.

She was a Canadian, with previous good health, and accustomed to good diet. There was a family history of tuberculosis. Menstruation had always been regular and unaccompanied with pain.

Condition on Admission.—The patient was stout and powerfully built, although rather anæmic; the gums were somewhat swollen and hæmorrhagic; the tongue was coated and fissured, and showed hæmorrhages upon the dorsum. Numerous subcutaneous hæmorrhages of various sizes existed over all parts of the body. Some were bright red, others brownish; whereas many were diffuse, extensive, irregular, and not elevated, others were smaller, firmer, distinctly nodular on deep pressure, and painful. There was no evidence of glandular enlargement.

The teeth were loosened in the alveolar processes, with blood oozing about them. The breath was foul, the appetite poor, and there was great thirst. No evidence of abdominal pain or tenderness. The liver and spleen were apparently normal in size. The urine was very acid (specific gravity 1017), and contained some albumin, a few casts, and a heavy deposit of amorphous urates and uric-acid crystals.

Blood examination showed 3,300,000 red corpuscles; moderate leucocytosis, with forty-five per cent of hæmoglobin.

In stained preparations there were present a few eosinophiles and free eosinophilous granules.

The subsequent history was that of rapid failure up to death, which occurred within ten days. During this period the patient vomited sev-

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eral times, losing in all more than three pints of a grumous bloody fluid. An *ascaris lumbricoides* was present in one vomitus.

The diagnosis was reserved; scurvy was suspected.

AUTOPSY (Performed three hours and a half after death; notes by Prof. Adami).—The body was that of a stout, broadly built adult woman, 186 centimetres long, nearly 50 centimetres across the hips. The face approached the negro type, and the complexion was swarthy. Gums anæmic, slightly swollen around the bases of the teeth, and presenting here a fine line of exuded blood. The upper and lower incisors and bicuspid loose. A small, deep hæmorrhage in the lobe of the left ear. Numerous punctiform petechiæ upon the neck. On the arms the skin was discoloured in patches, some areas measuring as much as 10.5 centimetres in diameter. These patches were irregularly distributed over the arms, but showed no elevations whatever. In both axillary regions there were clusters of petechiæ. On the trunk there were very many punctate hæmorrhages, forming a zone around the body above the umbilicus. There were no signs of hæmorrhage in the exposed mucous membranes of the vagina. The legs were affected similarly to the arms. In some places the hæmorrhages existed definitely at the roots of the hairs, while in other places there seemed to be no relation between the purpuric spots and the hair follicles.

Abdominal Cavity.—Massive panniculus, nearly 8 centimetres thick; very numerous petechiæ in the parietal peritonæum. The omentum large and fatty, and presenting numerous small hæmorrhages in its substance. The serous coat of the intestine and the appendices epiploicæ showed multiple punctate ecchymoses. There were about 20 cubic centimetres of turbid, faintly blood-stained fluid in the abdominal cavity.

Spleen.—Very large and heavy, measuring $18.3 \times 11 \times 4$ centimetres, and weighing 630 grammes. The edges were rounded and without notches. It was firm to the feel, and the surface presented a coarsely mottled appearance, with distinct yellowish areas not projecting from the deep red groundwork of splenic substance. These areas varied in size up to that of a split pea, and were not well

circumscribed. On section the organ was very firm, presenting throughout its substance the same yellowish areas of new tissue. Hilum normal.

Kidneys.—The right kidney slightly enlarged; the easily peeled-off capsule revealed a pale-yellow smooth surface, upon which could be seen a few small grayish-yellow nodules, resembling those in the spleen. On section it presented evidence of much fatty change, and a few minute new growths were distributed throughout the cortex. The pelvis and ureters were normal. The left kidney resembled the right.

Bladder.—Mucosa pale; upon it were numerous rounded, slightly projecting masses about 1 millimetre in diameter, around which there were punctate hæmorrhages.

Vagina.—Normal and without ecchymoses.

Uterus and Adnexa.—Enlarged; the wall greatly thickened and for the most part firm, though posteriorly there could be seen softer areas. The cervical portion especially enlarged, owing to the presence of a new growth, which appeared as a large rounded infiltrating mass, chiefly on the posterior portion. The mass was not sharply limited on all sides, but was continuous with tissue of a similar character in the body of the uterus itself. There were a few minute cysts centrally situated. The growth measured about 8 or 9 centimetres in its greatest diameter, and projected backward and somewhat upward, so that its superior part lay behind the body of the uterus itself. It was fairly firm on section, and free from juice. From the posterior portion of the fundus there was given off a firm pedunculated, subserous fibroid tumour, slightly lobulated, the greatest diameter of which measured 3.5 centimetres.

The right Fallopian tube was slightly enlarged, and was partially bound down by a few adhesions to the surrounding tissues. The fibrinated extremity was free. The right ovary was much enlarged, and contained a cyst 6 centimetres in diameter, with delicate transparent walls and thin, greenish mucoid contents. The solid tissue remaining was dense and uniform, measuring about 2.5 centimetres in thickness. The left tube was tortuous from old adhesions and en-

larged; the fimbriated extremity was free. The left ovary was greatly enlarged, partly from new tissue formation, partly owing to the presence of several cysts. It was fairly firm on section. The new growth seemed to extend upward, infiltrating the tissues of the broad ligaments and also of the Fallopian tubes. On the peritoneal surfaces of both ovaries there were numerous ecchymoses.

Stomach.—Large, with moderately thin walls and coffee-ground contents. Along the greater curvature at the middle of the cardiac convexity was a circular, flat, soft, grayish tumour 2 centimetres in diameter, projecting into the stomach cavity. The mucosa over it was superficially ulcerated; the edges thick and rounded. About the middle of the greater curvature there was a similar growth, and another 2 centimetres in diameter on the posterior wall, somewhat nearer the pylorus. In addition to these there were several small whitish nodules, which rendered the mucosa firmer and thicker than normal, and in one of them there were small hæmorrhages. There were no external evidences of new growth.

Intestine.—Throughout the small intestine there were minute submucous petechiæ; otherwise no abnormality existed. The large intestine was normal, save for a few ecchymoses near the sigmoid flexure.

Liver.—Some fatty infiltration; lobules distinct; no evidence of hæmorrhage.

Mesenteric Glands.—Normal.

Thoracic Organs.—In the mediastinal tissue there were a few minute ecchymoses. The pleural cavities were dry and free from adhesions. Lungs normal.

The heart showed ecchymoses on both layers of the pericardium and a patent foramen ovale; otherwise no abnormality.

Examination of the brain was not permitted.

Cultures on glycerin agar and on broth from the subcutaneous hæmorrhages, spleen, liver, heart's blood, and kidneys all remained sterile.

MICROSCOPIC EXAMINATION.—The *spleen* showed great congestion, very marked leucocytosis, much overgrowth of the lymphoid elements, and large numbers of small round cells lining the interior of

the sinuses. It is especially to be noted that wherever these cells were found their inner boundary was always limited by a single layer of spindle cells, resembling the intima of a vessel. (Plate XXI, Figs. 1 and 2.) In some places the trabeculae showed a distinctly abnormal number of small round cells following their direction. The Malpighian bodies were poorly outlined. The arteries were apparently free, and showed no evidence of emboli.

The *kidneys* showed, in addition to some parenchymatous degeneration, localized areas of small-celled infiltration, chiefly in the periphery of the organ. The new cells were most numerous between the tubules, often crowding them to one side and obliterating the lumina. The glomeruli in the neighbourhood were likewise surrounded by small round cells, their capsular epithelium was frequently proliferated, and their afferent blood vessels in some places seemed to be surrounded by small round cells. In most cases the greatest cellular infiltration was in the immediate neighbourhood of the glomeruli.

Sections of the *cervix uteri* presented the usual appearances of an infiltrating, small-round-celled sarcoma. There were a few punctiform hæmorrhages. The blood vessels presented free lumina, although there was infiltration both of the coats of many of the vessels and of the tissues immediately about them.

The *ovary* showed similar sarcomatous infiltration, there being but little of the normal tissue visible.

Sections through the tumour masses of the *stomach* showed a large amount of catarrhal exudate on the mucosa, extensive small-celled infiltration and new formation both between the gland structures themselves and in the submucosa; there was but slight infiltration of the muscular coat. The blood in the vessels showed considerable leucocytosis. The lumina of the vessels themselves were quite free from emboli in the sections examined, but the perivascular lymphatics showed very great infiltration with small round cells. In some places the vessel walls themselves were infiltrated with small round cells, though nowhere to a marked extent. There was a moderate amount of recent hæmorrhage in the submucosa.

The *liver* showed generalized infiltration of small round cells along the portal sheath. The growth had here extended into the wall of the vessel, and was bounded only by a thin layer of endothelial cells. There were no evidences of emboli within the vessels. The liver otherwise was moderately fatty, and the cells contained much bright-yellow pigment. (Plate XXII, Figs. 3 and 4.)

Sections of the *heart* showed over the hæmorrhagic areas of the pericardium some small collections of round cells, old and recent extravasations of blood, but no other pathological conditions.

The *skin* presented circumscribed nodules of small round cells, a great infiltration of the adipose tissue, and an involvement of the arteries and their coats similar to that described as present in other organs.

The *adrenal bodies* showed about the central vessel a slight amount of small-celled infiltration, but were otherwise normal.

In the *omental glands* there was an extensive growth of small round cells, corresponding in character to those above described.

ANATOMICAL DIAGNOSIS.—Sarcoma of cervix uteri and of ovaries, involving also the stomach, spleen, kidneys, adrenal bodies, liver, and skin. Purpura hæmorrhagica of skin, mucous membranes, and viscera.

Examination, therefore, of the tissues in this instance shows the sarcoma to have spread by various channels—viz., the lymphatics, especially those about the blood vessels, and further by an infiltration of the walls of vessels, which seemed to dissect out between the intima and muscular as well as the adventitial coats. There was no evidence of thrombosis in the veins or capillaries.

Emboli were nowhere found, although the portal venous system showed abundant evidence of the presence of sarcomatous growths.

CASE II.—Mary R., aged twenty-eight, entered the Royal Victoria Hospital on July 4, 1895, complaining of spitting blood and of the presence of bluish spots upon the limbs and body. The expectoration of blood had begun three days previously, and had been more or less continuous. There was also some hæmatemesis at the onset. The symptoms were not attended with cough. The dark spots on the limbs and

body were first observed five days prior to admission; they appeared first at the outer side of the right knee, and were accompanied with pain and tenderness; the colour, at first reddish, changed to pale brown, and then to darker brown, and the tenderness ceased. Rapidly following on this first effusion numerous other patches of various sizes appeared on the lower extremities, arms, and trunk.

Her past history was one of gastric disturbance, with frequent vomiting and some constipation during the past five years. There was no history of previous hæmatemesis, and no other evidence of gastric ulcer. She was a Parisian and unmarried. No history of deprivation or hardship. Her occupation was that of a dressmaker. The family history was tuberculous. There was no history of hæmophilia.

On admission she was weak, intensely pale, and was bleeding from the gums and other mucous membranes, while in the skin there were numerous subcutaneous hæmorrhages. Of these, some were slightly elevated, with a smooth surface and well-defined edges; in size they ranged from a five- to a ten-cent piece, some being circular, others crescentic. There were, however, some elevations of a similar size with hæmorrhages. Other large, diffuse, irregular subcutaneous hæmorrhages were not raised, and existed mainly in the folds of the buttocks and the inner surface of the left thigh; there were also many smaller non-elevated patches distributed over the body. The abdomen presented, a day or two after admission, a few areas as large as twenty-five-cent pieces, distinctly raised, and not uniform in colour. In the periphery of these there was a definite narrow ring of hæmorrhage, resembling very much the marks of an aniline pencil, while within the circle was a pale centre. Temperature, 99° F.; pulse, 120; respirations, 30. There was elsewhere no evidence of disease, but a vaginal examination was omitted.

During the patient's sojourn in the hospital the hæmorrhages increased, and her general condition became worse, the temperature higher, rising to 103° F., and the pulse ranging from 122 to 160. The respirations progressively increased up to 60. Some of the raised spots became flatter and faded, while others remained stationary. The urine and fæces were normal. The blood examination showed the red cells to vary between 1,000,000 and 2,000,000, the white cells 50,000, with a special increase in the lymphocytes. The hæmoglobin was about twenty-five per cent.

The treatment consisted in the administration of liq. arsenicalis, and later liq. calcis chloridi, in twenty-minim doses three times daily. The treatment otherwise was purely symptomatic, and, on the whole, was of no avail, death ensuing rapidly.

The diagnosis was multiple sarcomata with purpura hæmorrhagica.

AUTOPSY.—The body was that of a poorly nourished woman of about thirty years of age. Rigor mortis present; lividity in dependent parts. Mammæ rather poorly developed; the right moderately soft, the left presenting a small, firm movable tumour, well circumscribed, and not involving the skin. On the abdomen and chest were six or eight areas of bluish discoloration, more or less circular in outline, the largest equal in size to a twenty-five-cent piece. Their boundaries were remarkably well defined, and they had a firmer consistence than the surrounding skin. On section, also, they seemed firm, presenting free blood and blood pigment in the tissues. On the buttocks and at various parts of the lower extremities were several much larger effusions of blood beneath the skin, the largest about 12 centimetres in diameter and of very irregular outline. These latter, however, did not present the same firmness as that manifest in those on the abdomen. The visible mucosæ pale. No œdema.

Abdominal Cavity.—Panniculus adiposus moderately developed, with a yellow atrophic appearance; muscles brownish red in colour. The pelvis contained a small quantity of thin reddish fluid; the liver not visible below the ribs; the intestinal coils distended, their serosæ smooth and glistening, presenting here and there patches of hæmorrhage beneath. In the pelvic cavity were two large irregularly oval tumours, evidently connected with the adnexa of the uterus, freely movable with the tubes, and apparently ovarian (see below).

Spleen measured $14 \times 10 \times 4$ centimetres; weight, 340 grammes; large, smooth, of a uniform bluish-red colour, fairly soft on section, with apparent increase of pulp. Malpighian bodies indistinct.

The kidneys gave evidence of an acute nephritis, with engorgement of the medullary vessels. Beneath the mucosa of the pelvis and some of the calices of the left kidney there was some diffuse recent hæmorrhage. In the right kidney there was moderate hydro-nephrosis, some thickening of the ureter and narrowing of its lumen halfway down to the bladder.

The bladder showed a pale mucosa, with two or three punctiform hæmorrhages beneath it.

The liver was small and somewhat friable; its colour brownish.

The uterus was of about normal size; walls firm, especially at the cervix. Tubes apparently normal.

The ovaries were both converted into large more or less solid tumours; the left, which was reniform, measured $9 \times 5 \times 4$ centimetres; it was in the main solid, though fluctuating in parts. The surface, though somewhat nodular, was smooth and glistening, and presented some subperitoneal hæmorrhages. On section the solid part was homogeneous, free from juices, and contained a few minute hæmorrhages. The fluctuating mass contained a clear, thin fluid. The right mass was slightly more rounded and larger; it weighed 60 grammes. It was more fluctuating than the left, owing to the presence of smooth-walled cysts and cavities containing hæmorrhagic detritus, as well as other degenerated material. The vessels in the neighbourhood appeared free, and there was elsewhere no evidence of abnormality in the pelvic organs.

Thoracic Cavity.—In both pleural cavities there were about 100 cubic centimetres of a thin, turbid, reddish-brown fluid. On removal of the sternum, the lungs retracted in part only, being held fixed by loose adhesions at apex and base and by firmer adhesions in the central portions. The left lung showed, in addition to moderate œdema and anthracosis, some minute recent hæmorrhages into its substance; the larger blood vessels were free, the bronchi reddened. The right lung was similar in general character to the left, the hæmorrhages being likewise minute, and distributed more at the base than at the apex.

The Heart.—The pericardial cavity contained about 30 cubic centimetres of clear yellow serum. The surface was smooth and glistening. Beneath the visceral pericardium and over different areas of the heart there were numerous hæmorrhagic patches of a bright-red colour, none of them appearing old or of long duration; these were distributed most markedly over the left ventricle, almost covering its entire surface. In the various chambers of the heart there was a small quantity of blood. The various orifices and valves were normal. Beneath the endocardium of both the right and left sides of the heart there were likewise hæmorrhages of small size, and within

the heart muscle interstitial ecchymoses. There was early atheroma of the aorta. The peribronchial glands were normal.

The brain was free from hæmorrhages, and showed no abnormality beyond some congestion.

The thyroid gland showed bilateral enlargement with colloid degeneration, but no hæmorrhages. The remaining organs of the neck were normal.

Cultures on glycerin agar from the heart's blood, spleen, and liver remained sterile.

MICROSCOPIC EXAMINATION.—*The ovarian tumours* presented the characteristics of small-spindle-celled sarcomata, with a generous admixture of small round cells. There were large, irregular patches of hæmorrhage and great engorgement of the veins. A considerable amount of myxomatous change had supervened, while in other parts a kind of hyaline degeneration was apparent. The blood vessels, and especially the arteries, were in many cases seen to be packed with small spindle cells, even in directly transverse sections of the vessels.

The lymphatic glands in the region of the stomach and pancreas had but little of their lymphoid structure left, the specimens showing great infiltration, with small spindle cells arranged in the manner usual in sarcomatous growths.

The spleen showed great congestion; the Malpighian bodies were not very distinct, and the fibrous tissue was about normal in amount. There was no sign of new growth, nor evidence of hæmorrhage.

The kidneys were congested; the glomeruli apparently normal; the convoluted tubules in some cases showed cloudy swelling, in others advanced degeneration. In the sections cut there was no evidence of hæmorrhage.

The Stomach.—Sections cut through the hæmorrhagic portion showed both old and recent pigment. In the neighbourhood of some of the hæmorrhages there was distinct evidence of necrosis in the mucosa, submucosa, and muscular coat. There was, in addition, a small amount of cellular infiltration, with great congestion of the submucosa. The vessels of the stomach, and especially the arteries, showed in many places the lumina filled with spindle cells. In some

of them, cut transversely, blood-corpuscles and numerous spindle cells were irregularly intermingled. From the large number of these cells, and from the fact that they were massed together to such an extent as in many cases to occlude completely the lumen, it is hardly likely that they were endothelial cells; and, moreover, their outlines presented the characters of young connective-tissue cells rather than those of endothelial cells. (Plate XXIII, Figs. 5 and 6.)

The small intestine showed great congestion and hæmorrhages of moderate degree, with superficial necrosis of the mucosa; in addition, a considerable amount of small round-celled infiltration was apparent between the glandular structures.

The liver showed brown atrophy of the cells, but no evidence of hæmorrhages. In certain irregular areas in the periphery of the lobule there was a moderate amount of small-round-celled infiltration. None of the vessels contained emboli.

Heart Muscle.—In the subpericardial fat there was a large amount of recently extravasated blood, and there was also very much cellular infiltration, the cells infiltrating the tissues between the fat globules and being closely packed together. In many places the hæmorrhage and the cellular infiltration existed side by side. Within the heart substance there were many patches of recent hæmorrhage, with slight necrosis of the muscle fibres. In the vessels there were many spindle cells, while outside the adventitia of many arteries there were fairly large collections of small spindle cells closely packed together.

The lungs showed in some parts thin septa, whereas in other portions the meshes of tissue composing the septa were widely separated, apparently from œdema. There was but little cellular exudate in the alveoli, but here and there many patches of hæmorrhage were apparent. The blood vessels in the neighbourhood did not present very much abnormality, though in some of the arteries could be seen collections of small spindle cells, the signs here being apparently merely those of a desquamative angiitis.

The Skin.—Sections were taken not only from parts distinctly nodular in appearance, but also from the more diffuse hæmorrhages. In the nodular hæmorrhagic portions the epidermis and papillæ were

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fairly well marked in some places, while in others there was distinct flattening of the papillæ. The subcutaneous tissue seemed thickened, the meshes being in some portions widely separated, as though from œdema. The sudoriparous glands and hair follicles presented no abnormality, there being but a small amount of cellular infiltration in their vicinity. The hæmorrhages were for the most part deeply situated in the subcutaneous tissue. Many of the vessels in the neighbourhood were plugged with spindle cells, though in the vicinity of these there was no sign of sarcomatous growth, and the tissues stained poorly, being necrosed.

The conditions present in the latter case, therefore, show primary sarcoma of the pelvic organs, which had, to some extent at all events, advanced by way of the lymphatic system, and involved the glands in the neighbourhood of the cœliac axis, as is apparent both from the macroscopic and microscopic examinations. A more minute examination of the primary seat showed involvement of the vessels in the tumour, spindle cells filling their lumina. In the other tissues, moreover, and especially in those parts where hæmorrhage existed, the perivascular lymphatics appear to have conveyed the cellular elements, for on examination of some of the various affected tissues there were found in the perivascular spaces accumulations of spindle cells, with a moderate amount of hæmorrhage in their immediate vicinity.

GENERAL CONCLUSIONS.

The purpura accompanying the two foregoing cases of sarcomatosis would seem to find its explanation in the coexistence of several factors, the main feature being an involvement of the vascular system by the sarcomatous elements.

There existed in Case I a direct lesion of the vessel wall whereby the sarcoma cells invaded directly the various coats, and were found mainly between the intima and the adventitia, dissecting their way, as it were, along these tracts in the vessel walls. There was further an extensive involvement of the perivascular lymphatics, from which point, indeed, it would seem that the sarcoma cells had invaded the walls of the vessels themselves.

In Case II, moreover, not only was there a definite invasion of the lymph spaces near the vessels, but, furthermore, there was undoubted evidence of the existence of emboli of sarcoma cells in the lumina of the blood vessels; and in the immediate vicinity of such conditions hæmorrhages were invariably found. While some vessels, and indeed a great many, were quite free from such emboli, in others the lumina were completely occluded by spindle cells, so as to preclude the possibility that these were merely a collection of desquamated endothelial cells, such as is frequently found as the result of post-mortem changes. That such an embolic condition can exist is by no means an unreasonable supposition, and, while it is generally recognised that multiple sarcomata are usually made up of small round cells, in this case we have an undoubted example of sarcomatosis of the spindle-celled variety. There are numerous instances of this "embolic purpura," as it may be called, especially in French and German literature, the condition being associated with rheumatism, valvular lesions of the heart, and other diseases which induce directly or indirectly the formation of emboli. Krauss,* Gimard,† Leloir,‡ and others have insisted with considerable emphasis on the embolic origin of many purpuric conditions, and in some instances they have verified their observations by histological examination.

Leloir assumes that, in addition to the presence of the ordinary emboli and the changes in the vessel walls with desquamative endarteritis, the blood itself may be much altered chemically, and that in the cachectic conditions clots may be thrown down from the circulating blood and be carried onward to form capillary emboli, with resulting hæmorrhagic infarctions.

Krogerer,* some ten years ago, in examining the skin removed from patients with symptomatic purpura, found definite thromboses in the smaller veins, and even in the arteries. According to his view, the alterations in the vessel walls gave rise to slowed circulation and tendency to thrombosis, bringing about a liability to hæmorrhages.

* E. Krauss, *Ueber Purpura*, Heidelberg, 1883.

† Gimard, *Arch. gén. de méd.*, October, 1883.

‡ Leloir, *Annales de dermatologie et de syphillographie*, 2. sér., t. v, p. 1, 1884.

* Krogerer, *Zeitschrift für klin. Medicin*, 1885, Bd. x, Hft. 3.

His plates bear out his theories regarding the thrombi, many of which show considerable organization.

But a careful examination of the purpuric areas shows further that a mere invasion of the vascular system by sarcoma cells can not explain all the various blood effusions present. On examining the skin, for instance, in those areas where large irregular hæmorrhages had occurred, there was but little evidence of vascular invasion, while the emboli, on the other hand, seemed to exist mainly in the localized smaller and more circumscribed patches. One must therefore conclude that in such instances a combination of factors will alone afford a rational explanation of the purpura, and that in the general condition of the patient we shall find another cause for the enormous effusions of blood. In both of our cases there were high fever, cachexia, and a rapid progressive asthenia, all being the results of a sarcomatosis, and implying also grave alterations in the composition of the blood. From this we may infer an altered condition of the vessel walls, and hence probably a combination of circumstances sufficient to explain the incidence of hæmorrhage.

The raised cutaneous nodules in our second case, some of which were hæmorrhagic, can not be regarded as pure sarcomatous metastases, for on microscopic examination they merely revealed hæmorrhage or necrosis, or both, and sometimes plugging of the vessels. There was nowhere in these nodules evidence of new growths. Such elevations, then, must have been produced rather by a temporary serous or cellular exudation coincident with or following upon the hæmorrhage—a probability which is emphasized by the fact that during the last days of the patient's illness many of the nodules diminished in size. Whether the œdema and infiltration were secondary to the embolic process in the subcutaneous vessels or whether they were merely coincident with the hæmorrhage would be difficult to decide.

The ringlike spots, however, are of special interest, inasmuch as it has been shown that they have been present in more than one case of sarcoma. It is not impossible that such spots may be definitely related either to the embolic processes or to a direct invasion of the

cutaneous vessels, though, so far as we know, there do not exist any experimental proofs to bear out such a theory. From what has been said, however, it is evident that the cutaneous vessels were plugged during the last few days of the illness, at a time when the walls of the smaller vessels and capillaries were already greatly enfeebled. The result of the embolic formation may therefore mean a decided deficiency in the supply of nutriment to the involved area, the collateral circulation naturally being poor under the circumstances. As soon, then, as the vessels have become plugged, the surrounding blood supply would be poured in to a limited extent, and, on meeting the enfeebled vessels, might possibly break through their thin walls, thus producing a zone of hæmorrhage around the area deprived of its normal nutrition. In other words, the condition may be regarded as in many respects analogous to that presented in embolic infarcts in regions with end arteries, central necrosis with peripheral congestion and hæmorrhage being induced, the latter being chiefly limited to the outer zone of the necrotic area. The cutaneous vessels under such circumstances may be regarded as end arteries in a functional sense, since the collateral circulation would be so diminished under the altered conditions that no complete nourishment could be afforded to the area supplied normally by the plugged vessel. Von Recklinghausen * has directed especial attention to the occurrence of cutaneous hæmorrhages following embolic or thrombotic occlusion of peripheral arteries.

The possibility of some toxic condition as a factor in the production of the purpura in our cases may also be suggested; but while we would not exclude this possibility, we are unable to find any positive evidence in its favour. Focal necroses, which are often associated with toxic and infectious processes, were present only in direct association with the hæmorrhages, and were not distributed in the liver, spleen, and kidneys in the manner characteristic of toxic infections. Nevertheless the absence of these necroses does not exclude the possibility of the existence of some form of toxæmia. Infection demon-

* Von Recklinghausen, *Handbuch der allg. Pathologie d. Kreislaufs u. der Ernährung*, p. 160, Stuttgart, 1883.

strable by bacteriological examination was absent, and there is no reason to regard our cases as allied to the infectious purpuras.

The thermic theory suggested by Fagge at all events finds no place in the production of the multiple tumours in our cases, inasmuch as in each instance extensive visceral growths had given rise to the metastases.

In conclusion, we would express our gratitude to Prof. J. Stewart for permission freely granted to record the cases, as also to Prof. Adami, the director of the laboratory, who not only gave us much assistance in the preparation of this paper, but kindly undertook the entire work connected with the appended illustrations.

DESCRIPTION OF PLATES XXI, XXII, AND XXIII.

Fig. 1.—Spleen from Case I. Low power, $\times 55$. Masses of small round sarcoma cells are seen apparently lining the sinuses of the spleen. The other structures visible in this specimen are normal.

Fig. 2.—Part of the same under high power, $\times 240$. This section shows the sarcoma cells on the inner margin of the splenic sinuses; they are separated from the lumen of the sinus by a thin layer of endothelial cells, E. At one portion the cells are seen infiltrating between the fibrils of the sinus wall, I. M, the main wall of the sinus; P, the spleen parenchyma; S, sarcoma cells.

Fig. 3.—Liver from Case I. Low power, $\times 40$. The section shows a moderate small round-celled infiltration in the periphery of the hepatic lobule, following mainly the portal sheath.

Fig. 4.—Part of the same section under high power, $\times 240$. The small round sarcoma cells are infiltrating the portal sheath, and may be seen covered by a thin layer of endothelial cells; the condition is similar to that seen in the spleen. A, H, arteria hepatica; B, D, bile duct; L, liver cells; V, P, vena portæ.

Fig. 5.—Section through the stomach wall from Case II. Low power, $\times 40$. The arteries of the submucous coat are seen plugged with spindle cells, and in their immediate vicinity there are old and recent blood extravasations. H, hæmorrhage; N, necrosis; E, embolus of sarcoma cells.

Fig. 6.—The same under high power, $\times 180$. B, blood-corpuscles; E, embolus of sarcoma cells; N, necrosed tissue.

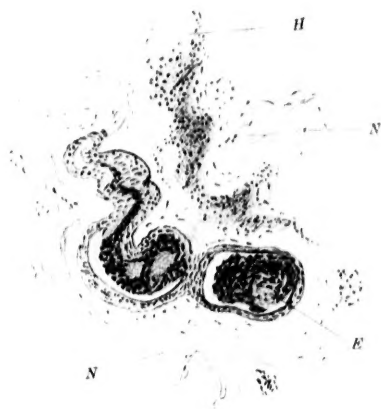


FIG. 5



FIG. 6



FIG. 1

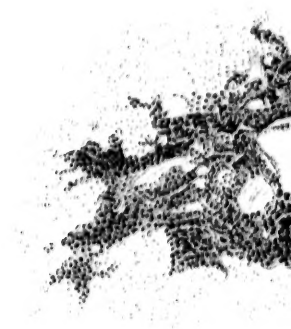


FIG. 3

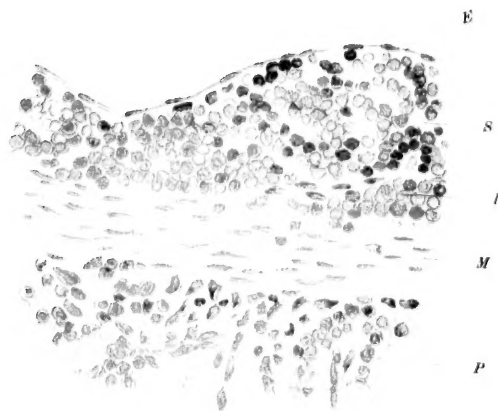


FIG. 2

A. B. & Co.

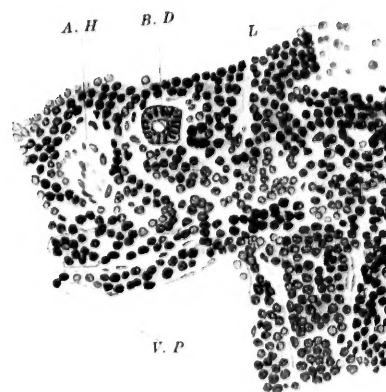


FIG. 4



FIG. 3



FIG. 4

A. H. H. & Co.

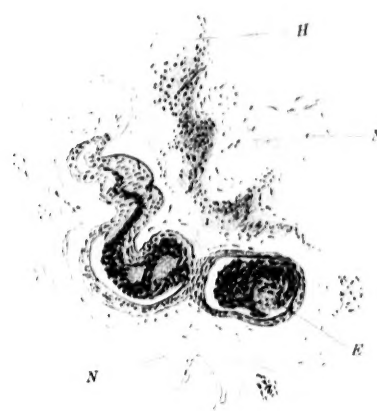


FIG. 5

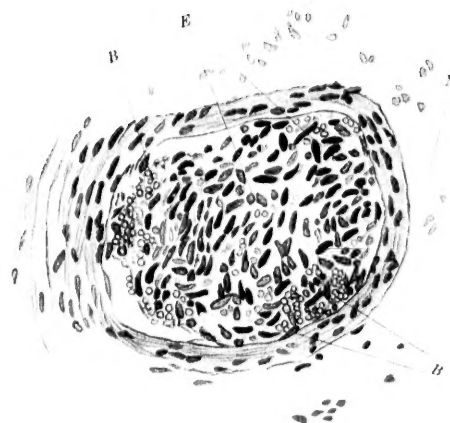


FIG. 6

A. H. H. & Co.